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5 January 1955

| PUREKABUAN            | PUK         | : Auting Chief, CFA  |
|-----------------------|-------------|--|
| SUBJECT:              | •           | Technical Information on Burial Materials  |
| REFERENCE:            |             | Memorandum from Acting Chief, CFA, to TSS/ND,  deted 13 September 1954 25  |
|                       |             |  |
| the office            | of !        | referenced memorandum, TSS/MD bas been asked to provide<br>Fraining with information on the capabilities of the<br>al meterials: |
|                       | a)          | Staidless Steel Burial Container   |
|                       | <b>b</b> ). | Nylon Back Rorrier Material  |
|                       | e)          | Not Dip Plastic  |
| 2.                    | The         | discussion of these items is centered about these factors:   |
|                       | 1.          | Amount of moisture vapor transmission  |
|                       | 2.          | Expected life  |
|                       | 3.          | Best wage  |
|                       | 4.          | Characteristic of material   |
|                       | 5.          | Information as to positive tests that have been run (Agency or Service)  |
| •                     | 6.          | Degree of sterility for each nuterial (Agency and U. S Allied)   |
| 3.                    | It :        | is hoped that the following report contains the necessary  |
| information           | <b>1</b> •  |  |
|                       |             |  |
|                       |             | 25   |
| DD/P/TSS/M            |             | Mechanical Division, TSS 25X   |
| Attachment:<br>Report | I.          | DOG SES OF DATE 26 JUNE 80 BY 057 49   |
|                       |             | SECRET ORIG CLASS PAGES 10 REV CLASS QUEST 22 NEXT REV 2010 AUTH: HR   |

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# BURIAL PACKETABET

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#### AMOUNT OF MOLETURE VAPOR TRANSMISSION

- a) Stainless Steel Container: Zero of transmission. The only place of possible penetration is around the rubbur gasket forming the seal between the container and the hinged cover. Our tests to date, while incomplete, indicate that the seal is noishure vapor resistant and remains so indefinitely. The box can be respended and closed without seriously reducing the effectiveness of the seal.
- b) <u>Hylon Back Borrier Esterial</u>: Tests on this item show the rate of transmission is so low as to make accounte measurement impossible. For all practical purposes, it is sero.

## ELPECIED LIFE

s) Stainless Steel Container: Dy virtue of the naterial used in its construction, the expected life for this item is at minimum five years and possibly much longer. Some tests have been run and others are now in progress. It is expected that the box will continue to provide protection for its contents

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for many years under the most adverse soil and water conditions. The weakest point is the gasket forming the hermetic seal.

- b) Mylon Back Borrier Esterial: The useful life of this material is dependent on the physical environment in which it is placed. Prolonged tests are currently being cade on the nylon naterial. Former short-range tests show that its expected life is measured in years rather than months. In one test, articles wrapped in this material were submerged in two feet of water at room temperature for nearly five months and were perfectly preserved. The best estinated expected life is a minimum of two years.
- c) Bot Dip Plastics: The life of this meterial is also measured in terms of years rather than months. Details of a recent test conducted by Ordnance at the Aberdeen Proving Ground are given under the "Positive Tests" section of this report. Type II plastic compound provided protection during an outdoor weathering test for 540 days. This material should provide adequate protection during burial for a minimum of two years.

## dest usace

- a) Stainless Steel Container: This is the best item available from the standroint of offering protection for cached articles under adverse coeditions for long periods of time. The container is 7 by 9 by 16 1/2 inches and weighs 8 pounds. It will cost approximately \$35 in small quantities: In the field, it has the advantage that it can be loaded and scaled in very short time, and no additional scaling apparetus or facilities are required.
  - b) Mylon Back Barrier Material: This ranks second to the stainless

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per linear yard and cames in rolls one yard wide. A heat scaling iron designed for closing heat-scalable barrier material is required to scal the meterial. The scaling temperature is 450°F with a dwall time of eleven seconds. Articles which cannot be hot dipped because of their configuration or heat sensitivity can be packaged in the mylon backed barrier material.

c) Hot Dip Plantics: While ranked below the other two items, hot dip compounds should not be treated as being inferior. These plastic contings have been used for many years and are proven items. Perhaps the biggest drawback in field use is that special dipping tends are required. Hot dip tanks are conservably evallable from a number of supplies both in America and abroad. It can be seen that this method does not readily lend itself to on-the-epot caching as does the stainless steel container.

## <u>CHARACTERISTICS</u> OF MATERIAL

- a) Stainless Steel Container: The weight, cost and case of scaling are characteristics which have already been mentioned. The steel is 22 gauge 316 stainless, providing excellent resistance against rust and corresion. Inside dimensions are 7 x 9 x 16 1/2 inches. All seams are heli-are welded. The gashet is made of rubber. We handles are presently provided for carrying but will probably be in the future. The box is painted with a special corresive—resistant paint.
- b) <u>Hylon Back Barrier Moterial</u>: This raterial is easy to use except that a heat scal is required as noted previously. It is the best flexible barrier exterial available for caching. Over long periods it has been noted

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that delamination of the outer layer occurs. This does not seem to reduce its effectiveness as a unterproof barrier directly, but it undoubtedly reduces its strength and thus makes penetration by water through rips and tears more likely. It is believed that future productions of this material will climinate this difficulty. The material is febricated of five separate plys as follows:

| PLY                   | HUBER |
|-----------------------|-------|
| t make the section of | 100   |

#### MATERIAL

1

.001 Inch thick virial film

2 and 4

.00045 " " aluminus foil

3 end 5

2.5 cance minisum per square yard plain weave nylon.

It has these strength properties:

| Breaking Strength () | karp & Pil | l Direction), | lbe. | 150 |
|----------------------|------------|---------------|------|-----|
| Tearing Strength (   | a n s      | * ),          | 数    | 25  |
| Weight. Cunces For S | quere Yer  | 4             | •    | 2.5 |

As stated in the manufacturing specifications (MIL-B-13238 Ord), the barrier material shall not lose more than 20% of its strength properties when wet.

e) <u>Not Dip Plastice</u>: This material is cellulose acetate butyrate.

Because of its widespread and comparatively long use, this material and facilities for its use are readily available in most parts of the world. Nany types of hot dip compounds are manufactured by different firms. Soc-uniformity from batch to batch is sanctimes experienced. Each procurement should be checked to make ourse it meets the MIL specification JAN-C-169. Type II.

Hot dip costings provide good corrosion and impact resistance.

After a long time it may tend to chip rather than peel. Usually it can be easily removed from the article it covers by peeling it off like the skin from a

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tangerine.

It is not advisable to not dip items which have small holes or crevices. The plastic may not form about these crevices and thus will not lie firmly against the article. It may be difficult or impossible to strip the plastic from any holes in the article. Such articles may be wrapped in aluminum foil or muslin bags and then hot dipped.

Hot dip is unsuited for anything which would be desayed or which is unsafe when reised to a high temperature. Tests are now being planned to check the feasibility of dipping explosives and insendiables.

The required thickness of the plastic coating is from .050 to .100 inch. Hot dip resists best at 125°T with a minimum of guesquess and cold at -5°T without any apparent after effect. Type II compound is superior to Type I and is recommended in all cases.

#### POSITIVE TESTS THAT HAVE BEEN HUN (Agency sud Service)

a) Stainless Steel Container: The tests performed to date on this liter consist mostly of inspection and acceptance tests during production plus water subsergence tests for leakage. An extensive long range testing program is now in progress. Boxes have been cached under a wide variety of soil and water conditions. The first results from this program will be forthcoming within a half year. In addition, these containers have been in operational use for about six months, but as yet, no reports have been received.

The manufacturing specification for the stainless steel container call for the following tests before the box is considered exceptable:



Such box must withstand without leakage an internal air pressure of five pounds per square inch for a period of two-three minutes when completely submerged in water and held below the surface at a depth of at least six inches. The gashet must have the proper compression of 30 per cent. The box must withstand a static load of 460 pounds on its maximum area. The heap is tested by slewly applying to it an upward force of 560 pounds for a period of one minute with the box resting on its bettem and the cover fully open. The gashet is tested to see that it remains sung and does not stick at 165°F for a period of 24 hours. Welding coupons are made to see that a 1/2 inch section taken across the seem of the weld can withstand a load of 1,600 pounds dead load without separation of the welded joint.

b) Bylon Back Berrier Material: As with the stainless steel box, the most extensive testing of this item was begun a few months ago and is currently in progress. Articles packed in mylon have been cached under a wide variety of soil and water conditions. Initial results from this progress will be forthcoming within six months.

A test at an Agency installation has been cited in this report where items wrapped in the sylon material and submerged in two feet of water at room temperature for mearly five months were perfectly preserved. Some delamination of the outer layer occurred but did not affect the protection provided by the material.

Another test was conducted at a different installation during which sylon back barrier unterial was subjected to both fungi and climatic tests. The climatic test was subdivided into fungus infected soil, tropical burial, cyplic burial (-30°F to  $\neq$  130°F), and water innersion. No trouble was experienced from fungus attacks. Of five items enclosed in nylon back barrier natural and given cyclic burial, one failed at the seem. The two units subjected to the immersion test failed. These failures were caused by improper scaling due to a



shortage of material and were not termed failures of the material. These tests were run in the latter part of 1953 and lasted six weeks.

c) Het Dip Plastics: Many tests have been run on this longestablished item, both by the Agency and by the military and commercial firms.

This item is also included in the current long-range test program. Not dipped
items were included in the two tests mentioned above. In the five-month submergence test, all items were perfectly protected. Upon stripping, it was seen
that the articles were covered with a thin oil film from the plastic.

In the other tests (fungi and cyclic burial), those units tested all gave adequate protection. The fungi test did show that the Type II, callulose-acetate butyrate, provided more resistance than the Type I, ethyl callulose.

Tests on hot dip began in June 1950 at the Abardeen Proving Ground and are to run for an indefinite period. Pieces of metal were dipped in Types I and II hot dip compounds meeting military specification JAN-C-149 and were left expect to weather. The following is from an Ordnames report on these tests:

"Type I failed to protect and strip properly after sixty days outdoor exposure and falled in twenty-four hours in an accelerated Weatherometer test.

"Type II failed to protect after 540 days sutdoor exposure and failed in the Weathercoster after 1,030 hours. It was placed in an exygen bomb for seventy-two hours at 160°F and 100 pounds pressure. Those formulations which exhibited poor outdoor weathering failed within 106 hours in a humidity cabinet after being subjected to the exygen bomb. Those exhibiting good outdoor weathering failed within 230 hours. A combination of the exygen bomb and humidity cabinet shows premise of being a suitable accelerated test for evaluating the outdoor exposure performance of strippable compound."

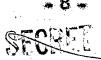


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### DANIES OF STREET

- a) Stainless Steel Container: The box bears no markings. Type 316 stainless steel is used, and a chemical analysis of the box would probably not even reveal in what country the steel was made. Although the Army does not use a box like this one, its bardwere is civiler to that of Army containers from which it was adapted. There is nothing about the box to identify it with the Agency.
- b) Mylon Back Barrier Heterial: There are to identifying markings on the meterial. It would probably be attributed to American manufacture. There is nothing about it to comeet it with the Agency.
- c) Het Dip Compounder Its Long and widespread usage sakes this product advantageous from a sterility viewpoint. It has been used by the military for over ten years. It is used consercially, not only in this country but also abroad, especially in European countries such as Germany. There is no reason for its being attributed to the Agency.



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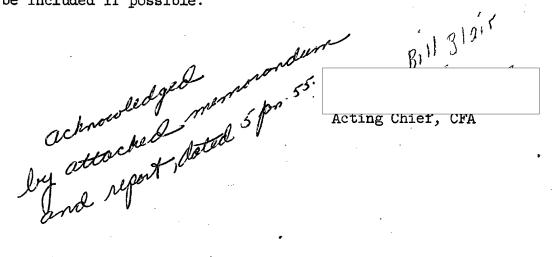
13 September 1954

| MEMORANDUM FOR: |  | R & | D | Section, | TSS | 25 | 5X1 |
|-----------------|--|-----|---|----------|-----|----|-----|
|-----------------|--|-----|---|----------|-----|----|-----|

SUBJECT:

Technical Information

- 1. It is requested that TSS furnish the Office of Training the technical information on the capabilities of the hot dip plastic and nylon foil barrier materials and the stainless steel containers from the following points:
  - a. Amount of M.V.T.
  - b. Length of expected life
  - c. Best usage
  - . d. Characteristic of material
    - e. Information as to positive tests that have been run (Agency or Service)
    - f. What degree of sterility for each material (Agency and U. S. Allied)
- 2. The above information is to be used in training and in compiling information for a booklet on caching and caching material. Any other information that would be pertinent to this subject should be included if possible.



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